

### **REMARKS**

In view of the above amendments and following remarks, reconsideration of the rejections contained in the Office Action of December 19, 2002 is respectfully requested.

It is initially noted that a number of minor editorial changes have been made to the specification and abstract for the sake of form. These have been presented in the form of a substitute specification and abstract. No new matter has been entered.

In the Office Action, the Examiner rejected claims 3-4, 13-16 and 18 as being anticipated by Nishizawa, U.S. 4,874,458 (Nishizawa). Further claims 13-16 and 18 were rejected as being anticipated by Atami et al., U.S. 5,871,581 (Atami). In addition, claims 5-8 and 17 were rejected as being unpatentable over Nishizawa in view of Sasaki et al., EP 0786542 A1 (Sasaki). Claims 5-6, 9 and 17 were rejected as being unpatentable over Nishizawa in view of Furuya et al. (Furuya), and claims 5, 10 and 17 were rejected as being unpatentable over Nishizawa in view of Nitanda et al., U.S. 5,359,452 (Nitanda). However, it is respectfully submitted that the present invention, particularly as now set forth in new claims 19-36, clearly patentably distinguishes over each of the references cited by the Examiner.

The present invention is addressed toward the problem of growing of a high quality and a high performance single crystal, particularly when using a highly viscous raw material melt. With high viscosity materials, in the prior art the flow of the raw material melt in a crucible is retarded, causing nonuniformity in temperature, degree of supersaturation, etc. This tended to lead toward the quality of the resulting crystal being lowered.

The present invention addresses this problem in the prior art by providing a stirring member in the crucible. During the growth of a single crystal, a seed crystal is brought into contact with the raw material melt in the crucible, which has been heated and melted. The crucible is rotated without rotating the stirring member in the crucible in the raw material melt during the process of growing the crystal. The stirring member can either be a blade member having a screw form, or a baffle member comprising a plurality of baffle plate fragments, for the purpose of stirring the raw material melt in the crucible. During the growth of the single crystal, the raw material melt is slowly cooled

below the liquid level of the raw material in order to precipitate the single crystal on the surface of the seed crystal.

The stirring effect of the stirring member of the present invention causes the molecules of the raw material melt to essentially form smaller units, so that the grown crystal can have a higher quality. Without such stirring, the units would become larger and would adhere to the growing crystal so that the resulting grown crystal would have a lower quality.

The cited patent to Nishizawa employs a baffle plate 16. However, as can be seen from Nishizawa, it is located toward the upper part of the crucible, and largely comprises a horizontal disc. As discussed in Nishizawa, this baffle plate obstructs the heat convection current that occurs below the baffle plate to minimize impurity contamination of the single crystal. The baffle plate also has feed melt guiding portions 16a which effectively result in the growth of the single crystal being sped up.

By contrast, the stirring member of the present invention is used for stirring in order to grow high quality and high performance single crystal in particularly when a high viscous raw material melt is used. It is not used for speeding up the growth of the crystal or obstructing the heat convection current. Actually, in the case of using a highly viscous raw material, the growth of the crystal would be slowed down due to the effect of the stirring of the present invention.

The distinction between the present invention and Nishizawa is made more clear in each of independent claims 19, 33 and 36 by reciting the stirring member as selected from one of a blade member having a screw form and a baffle member comprising a plurality of baffle plate fragments. Nishizawa clearly neither discloses nor suggests a stirring member selected from either a blade member having a screw form or a baffle member comprising a plurality of baffle plate fragments. These types of baffles are described in the specification, for example toward the bottom of page 8.

Accordingly, it may be seen that new independent claim 19, describing the method according to the present invention, distinguishes over Nishizawa as Nishizawa fails to disclose or suggest rotating the crucible without rotating the stirring member, the stirring member being selected as discussed above. Nor does Nishizawa disclose or suggest the stirring member as recited in each of claims 33 and 36. Accordingly, all of the claims now pending in the present application clearly distinguish over Nishizawa by itself.

The secondary references cited by the Examiner to Sasaki, Furuya and Nitanda also clearly fail to disclose or suggest any such stirring member.

The Examiner also cited the U.S. patent to Atami as anticipating claims 13-16 and 18. However, the wall forming the inner crucible 12 in Atami is clearly not a baffle member as recited in the claims. In any case, it is noted that the "baffle member" of Atami is used as a flow restriction member to restrict the flow of the semiconductor melt to the central chamber from which a single crystal is pulled. It is clearly not a stirring member as described in each of independent claims 19, 33 and 36.

In view of the above, it is respectfully submitted that the present invention as now set forth in claims 19-36 clearly patentably distinguishes over all of the references cited by the Examiner. Indication of such is respectfully requested.

In view of the above amendments and remarks, it is submitted that the present application is now in condition for allowance, and the Examiner is requested to pass the case to issue. If the Examiner should have any comments or suggestions to help speed the prosecution of this application, the Examiner is requested to contact Applicants' undersigned representative.

Respectfully submitted,

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